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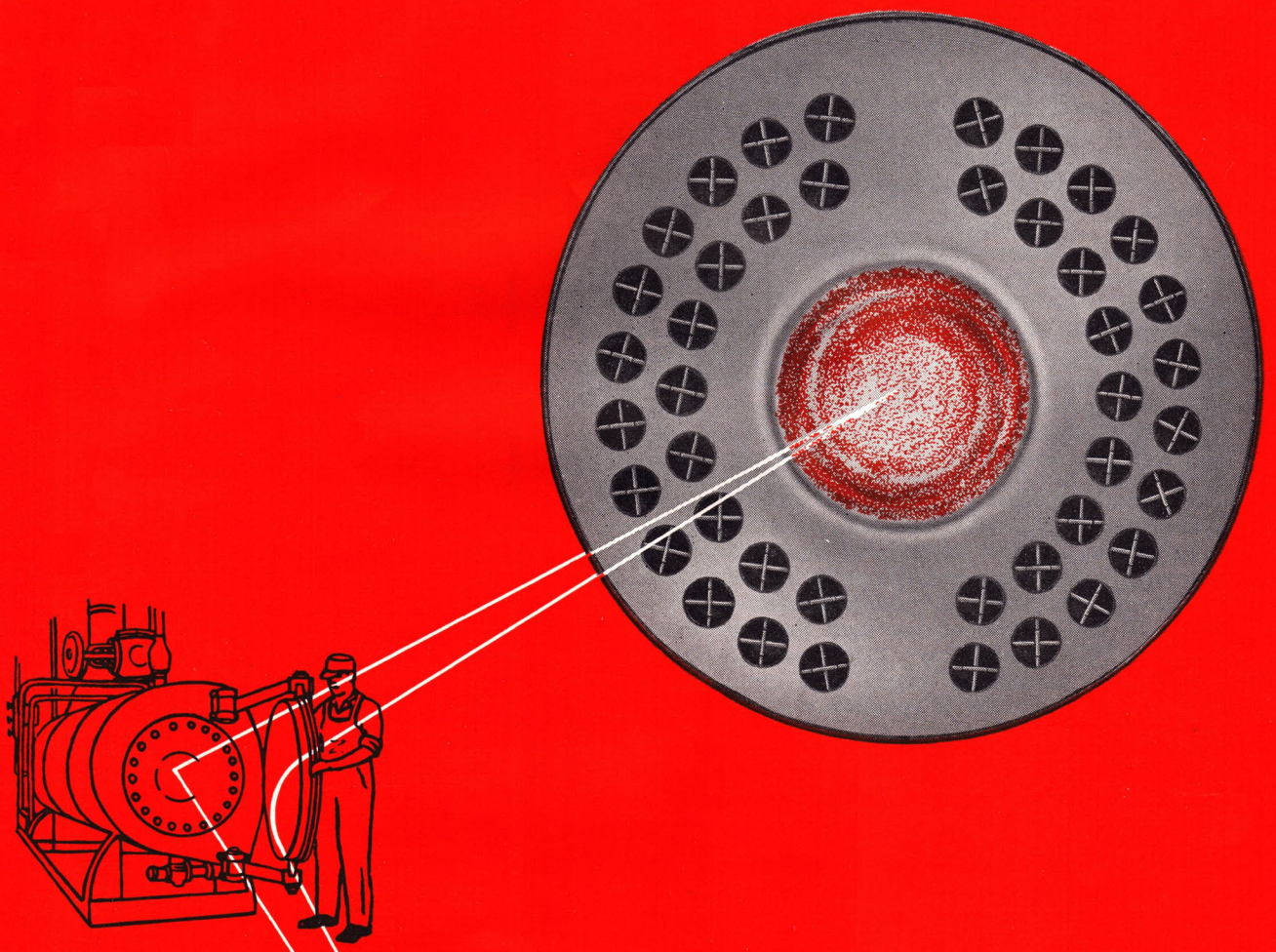
CY

years ahead in steam generation



package steam generators

CYCLOTHERM

Cyclotherm steam generators

A patented method of combustion which makes available to you a compact generator of two pass design. Completely self contained, fully automatic and fired with any liquid or gaseous fuel.

The guaranteed high efficiency of Cyclotherm steam generators is due to the patented Cyclotherm principle of combustion. This principle controls the characteristics of the flame resulting in a high rate of heat transfer by direct radiation.

In the Cyclotherm generator complete combustion takes place within the main fire tube. This main fire tube acts as a passage for air, fuel and the products of combustion. The air is introduced in such a manner as to form a free spiral vortex along the axis of which a core is formed. This free spiral vortex serves as the combustion supporting space while the core functions as the fuel delivery space.

The atomized fuel within the core is subjected to progressive thermal breakdown yielding particles of free carbon which are heated to incandescence. As these particles swirl around within the core they come in contact with the inner strata of air of the vortex and are completely burned. While the rotary motion of the cyclone of flame is extremely rapid, the axial motion through the furnace is relatively slow. In this way rapid, evenly distributed heat transmission to the water by direct radiation and convection takes place along the entire length of the first pass resulting in the maximum release of heat.

An important result of cyclonic action is the formation of a protective sheath of revolving air which prevents direct impingement of the flame against the wall of the main fire tube.

In the second pass, the cyclonic effect is recreated by an arrangement of vanes which causes a free spiral vortex flow of the products of combustion through the return tubes resulting in a very high rate of heat transfer.

The unique Cyclotherm Combustion and heat transfer principle results in a generator which requires approx. 60% of the heating surface required by other package boilers.

Each Cyclotherm unit is built and approved in accordance with ASME and National Board codes, and complies with all state and local regulations. Due to the high standards of manufacturing Cyclotherm units also bear the label of the Underwriters' Lab. Inc. Each unit undergoes a rigid fire test under specified operating conditions prior to final approval and release.

advantages

High efficiency

The Cyclotherm Steam Generator utilizing the Cyclotherm principle assures a guaranteed minimum efficiency of 80% and can be fired with oil, gas or with a combination of oil and gas.

High efficiency is possible for the following reasons:

Complete combustion

Every particle of fuel is consumed in the combustion chamber which is in itself a complete heat transfer element. In the larger units the modulated control provides for efficient operation of the unit at any level between 30% and 100% of rated capacity. Automatic changes in the quantity of proportioned fuel and air reduces steam generating capacity, and still maintains the guaranteed high efficiency.

High heat transfer rate

The Cyclotherm combustion chamber accounts for 65 to 75 per cent of the heat transfer due to the unique Cyclotherm principle. The full flame intensity is applied where the heat can most effectively be transferred to the water; and this high heat intensity in close proximity to the steel fire tube is possible, because a thin layer of air resulting from centrifugal force is always between the flame and the tube. This layer of air prevents flame impingement on the metal.

The simple design and high rate of heat transfer of the fire tube and return tubes causes rapid and unimpeded circulation of water within the pressure vessel. This circulation is designed to completely sweep the main fire tube and return tubes minimizing the usual scale and dirt deposits.

Compact design

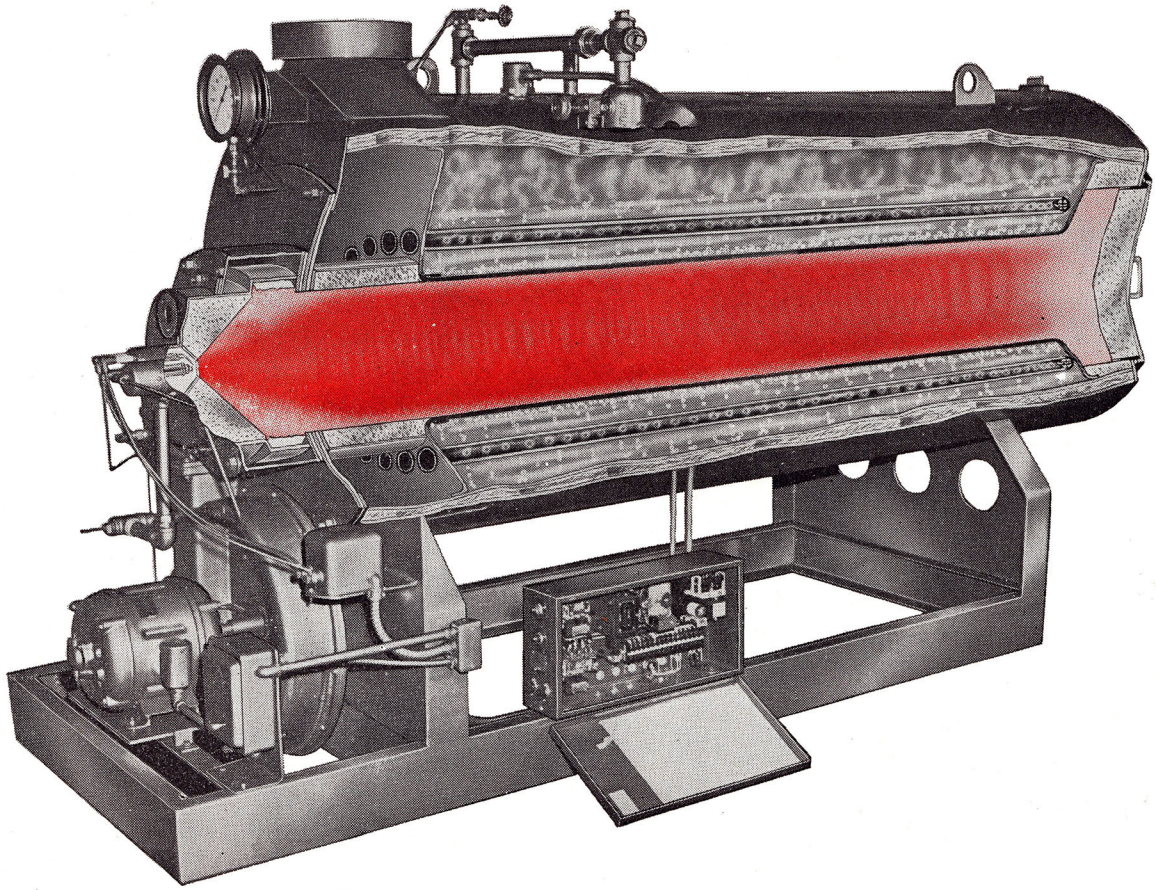
The simple, two pass construction of the steam generator and the standard control system, makes available a compact unit which is easy to maintain at peak performance without special skill.

No installation costs

No extensive stack, boiler foundation, extra insulation, excavation or instrumentation is required. The Cyclotherm unit arrives complete with automatic control panel, fibre glass insulation and refractories ready to generate heat. The contractor merely sets the Cyclotherm on the spot you choose and makes five easy connections: fuel, electricity, water, steam, and a simple flue to comply with local codes.

Low maintenance

The simple two pass construction presents no difficulties to operate and keep clean. The main combustion area is automatically swept clean by the cyclone effect of the air, and the single pass of return tubes is easily accessible by means of a door on the rear of the unit which is easily removed.



engineering features

1. Cyclonic flame

Air enters the combustion chamber at extremely high velocity in a revolving spiral vortex which travels the entire length of the furnace. The fuel is introduced into the entering air where it is slowly consumed as it moves in a cyclonic motion down the combustion chamber. This highly luminous slow burning flame radiating heat to the fire tube through direct radiation and by convection results in an unusually high rate of heat transfer.

2. No direct flame impingement

In spite of the high rate of heat transfer through the fire tube there is no flame impingement. This is due to the formation of a thin layer of air between the burning gases and the fire tube.

3. Automatic safety controls

The Cyclotherm unit is completely equipped with modern automatic safety devices to provide fool-proof protection against low water, excess steam pressure, ignition air or flame failure.

4. Moulded refractory

This steam generator requires a minimum amount of refractory material. Moulded refractory is used around the burner head to insulate the burner nozzle assembly and on the inside of the back cover plate. As there are no refractory baffles necessary there will be none to replace.

5. Vortex action in return tube

The cyclonic effect is recreated in the second pass by an arrangement of vanes which provide a free spiral vortex motion of the hot gases to increase the rate of heat transfer.

6. Rapid water circulation

The simple two pass construction makes possible a high rate of water circulation within the unit. This rapid water circulation past the tubes prevents the formation of mineral deposits on the tubes. This is an important reason for the continued high efficiency of Cyclotherm Generators after extended use.

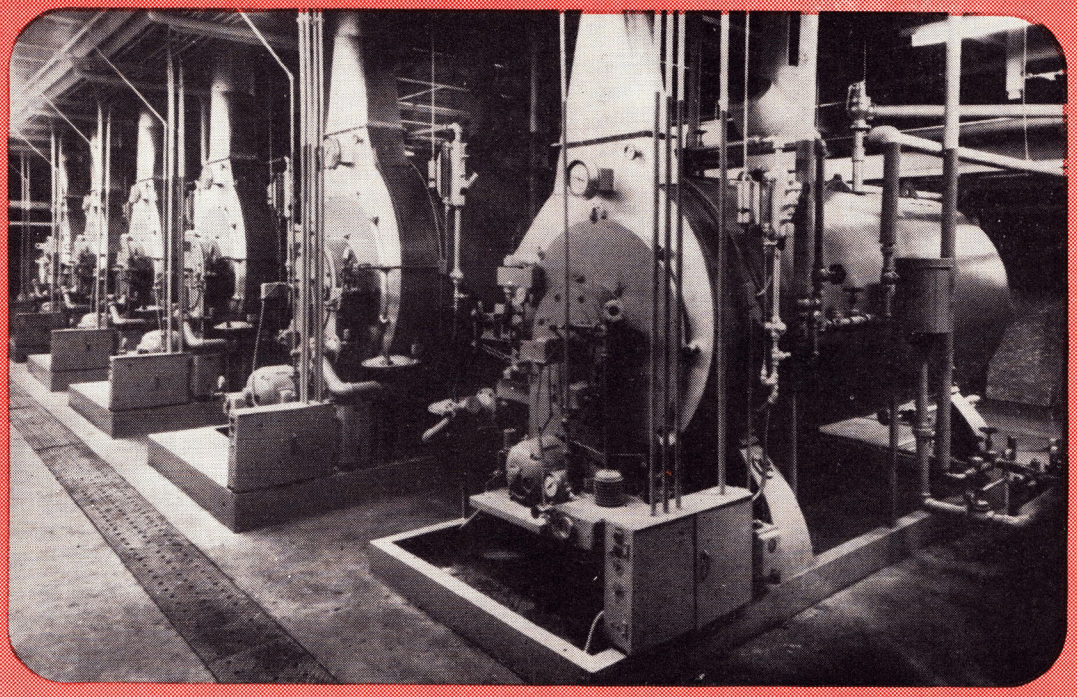
7. Fibre glass insulation

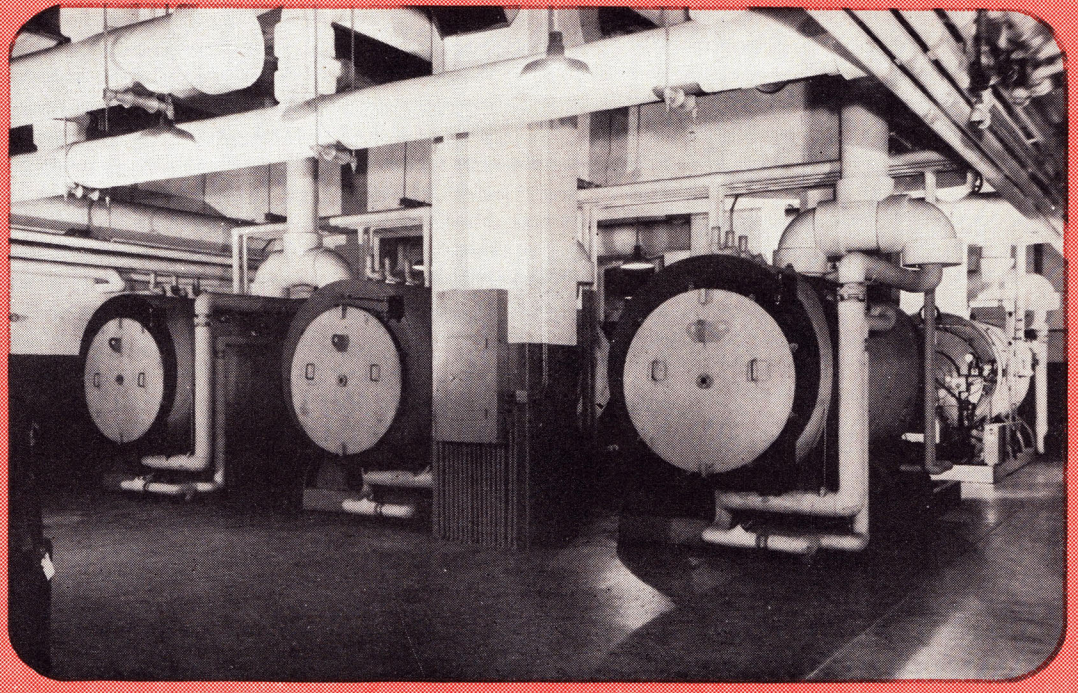
The entire boiler surface is insulated with fibre glass on which is fitted a metal jacket. Thus the immediate working area in which the steam generator is placed is safe and comfortable.

8. No stack required

The complete combustion of the fuel eliminates the need for a stack. All that is required is a simple flue to comply with local ordinances.

typical battery installations





standard ratings and dimensions

standard ratings for design pressures from 15 to 200 psi

Model No.	HP	Output BTU per hr.	Steam Units		Hot Water Units	
			Steam per hr. (pounds)	Equivalent Direct Radiation (sq. ft.)	Gallons per hr. (100° rise)	Equivalent Direct Radiation (sq. ft.)
C-600	18	600,000	600	2,500	743	4,019
C-1000	30	1,005,000	1,035	4,185	1,240	6,700
C-1400	40	1,340,000	1,380	5,580	1,655	8,930
C-2100	60	2,010,000	2,070	8,375	2,480	13,400
C-2800	80	2,680,000	2,760	11,165	3,305	17,865
C-3500	100	3,350,000	3,450	13,955	4,135	22,330
C-4400	125	4,187,500	4,315	17,445	5,170	27,915
C-5200	150	5,025,000	5,175	20,935	6,205	33,500
C-7000	200	6,700,000	6,900	27,915	8,270	44,665
C-8700	250	8,375,000	8,625	34,882	10,337	55,782
C-10500	300	10,050,000	10,350	41,850	12,405	66,900
C-12000	350	11,725,000	12,075	48,850	14,475	78,115
C-13800	400	13,400,000	13,800	55,830	16,540	89,330

Note: Data on 500 HP units available upon request

standard burner arrangements

Fuel	Cyclotherm Model No.
Light oil, 1 to 3	C-600 thru C-13800
Heavy Oil, 5, 6 and Bunker C	C-2100 thru C-13800
Gas, Mfg., mixed and natural	C-600 thru C-13800
Comb. light oil and gas	C-600 thru C-13800
Comb. heavy oil and gas	C-2100 thru C-13800

dimensions, weights, firing rates, and electrical load requirements

Model	Overall Dimensions (in Inches)			Approximate Unit Weights (Pounds)										Approximate Full Load Firing Rates (per Hour)					Approximate Electrical Input			
				15 psi		100 psi		125 psi		150 psi		200 psi		Oil-GPH		Gas—Cu. Ft.			Motor HP			pre-heater amperes ⊖
	length	height	* width	wet	dry	wet	dry	wet	dry	wet	dry	wet	dry	light †	heavy ▲	mfg. (540 BTU)	natural (1000 BTU)	mixed (870 BTU)	burner	heavy oil pump	light oil pump	
C-600	71	43½	27½	1625	1315	1625	1315	1625	1315	1625	1315	1625	1315	5½	◇	1400	750	860	¾	◇	‡	◇
C-1000	80½	55	41	2445	1900	2445	1900	2445	1900	2445	1900	2445	1900	9	◇	2396	1295	1487	2	◇	‡	◇
C-1400	110¼	55	41	3575	2400	3575	2400	3575	2400	3575	2400	3575	2400	12	◇	3100	1675	1925	2	◇	‡	◇
C-2100	124	63¾	45½	4825	3400	4825	3400	4825	3400	4825	3400	4825	3400	18	17	4650	2510	2890	3	1	‡	16
C-2800	152	66⅜	55	8665	5350	8865	5550	8920	5605	9065	5750	9265	5950	24	23	6200	3350	3850	3	1	¾	16
C-3500	162	73½	64	11900	6710	12175	6975	12175	6975	12240	7040	12305	7105	30	28	7750	4190	4810	7½	1½	1	24
C-4400	173½	84¾	68½	15250	8850	15650	9250	15650	9250	15735	9335	15590	9490	38	35	9695	5235	6015	10	1½	1	48
C-5200	197½	91½	76½	22690	14690	23015	15015	23015	15015	23090	15090	23160	15160	45	42	11630	6280	7220	10	1½	1	48
C-7000	224½	98¾	81¾	27200	15500	27965	16265	28160	16460	28375	16675	28625	16925	60	56	15510	8375	9625	15	1½	1	48
C-8700	251½	98¾	81¾	27934	16234	28699	16999	28990	17290	29405	17705	29892	18192	75	70	19400	10475	12050	25	1½	1	48
C-10500	252	102½	88	36700	23850	36950	24050	37150	24350	37350	24400	37850	24600	90	84	23200	12580	14500	25	2	1½	72
C-12000	252	102½	88	37300	24450	37550	24650	37750	24950	37950	25000	38450	25200	105	98	27000	14650	16900	25	2	1½	72
C-13800	252	102½	88	37900	25050	38150	25250	38350	25550	38550	25600	39050	25800	120	111	31020	16750	19250	30	3	2	72

*For heavy oil units add from 7″ to 13″ to width to accommodate oil preheater.

†No. 1, and No. 2 fuel oil per CS12-48 and diesel oil—28 to 40 API gravity.

▲No. 4, No. 5 and No. 6 fuel oil per CS12-48—14 to 26 API gravity.

◇Models C-600 thru C-1400 not equipped for heavy oil: do not use preheater.

‡Models C-600 thru C-2100 do not have separate light oil pump. Burner motor drives oil pump.

⊖Based on 220 volt 3 phase input—current input at 440 volts will be half of value given.

general specifications

C-2800 to C-13800: 80 to 400 HP

burner arrangements

may be equipped with any one of the following

1. light oil burner

Variable capacity oil atomizing nozzle: Pressure atomizing type, giving a fine, cone-shaped spray in the furnace. By controlling the rate of return from the nozzle, the firing rate is automatically modulated over a wide range in response to steam demand.

Oil burner regulating valve: Connected to the modutrol motor and controls the amount of oil flowing through the variable capacity nozzle to the furnace. Linkage to the air valve automatically maintains proper air-oil relationship, for all firing rates throughout the wide range of modulation.

Fuel oil pump and assembly: A rotary, motor driven gear-type oil pump. Delivers fuel oil to the burner at a constant pressure of 240 psi.

Ignition: Same as for heavy oil.

2. gas burner

Gas burner nozzle: Delivers raw gas fuel to the burner. There is no premixing of the gas with air before it reaches the burner, and no chance of a backfire as in a premixed type burner. Ignition is assured by pilot gas flame.

Gas burner regulating valve: Connected to the modutrol motor, and controls the amount of gas supplied to the burner. Linkage to the air valve automatically maintains proper air-gas relationship for all firing rates through the wide range of modulation.

3. combination light oil and gas burner

Burner for gas or oil: With combination burner all equipment listed under Number 1 and 2 is provided.

4. heavy oil burner

Variable capacity oil atomizing nozzle: Same as for light oil above.

Oil burner regulating valve: Same as for light oil above.

Fuel oil pump and assembly: A rotary, gear-type oil pump, mounted separately with its own motor. Delivers fuel oil to the burner at a constant pressure of 300 psi. This pumping unit is installed adjacent to the heavy fuel oil tank.

Steam oil preheater: For heating the heavy oil. Assures a constant flow and unvaried temperature to the burner nozzle.

Electric oil heater: Controlled by a thermostat, for heating the heavy oil on initial start until steam pressure is sufficient to heat the oil with the steam oil preheater.

Ignition: The electric spark from the ignition electrode is used only to ignite the gas pilot. The gas pilot, in turn, provides positive ignition of the burner.

5. combination heavy oil-gas burner.

Burner for gas or heavy oil: With combination burner equipment listed under number 2 and 4 is provided.

controls

Control panel: This panel is housed in a metal drip-proof cabinet with cover and is mounted near the front of the unit. This panel is completely wired on installation. A wiring diagram for the complete installation is mounted inside the cover.

Pressure control: Actuated by steam pressure, will stop the burner at any desired pressure setting and will restart the burner of a lower pressure setting. Pressure and differential settings are adjustable.

Modulating pressuretrol: A pressure actuated controller which automatically controls the modutrol motor to increase or decrease the firing rate as required by fluctuations in steam demands and maintains a constant boiler steam pressure.

Modutrol motor: The Modutrol motor operates the air inlet to the furnace and oil or gas regulating valve which are synchronized to supply the proper amount of air and fuel to the burner for the most efficient combustion at any firing rate.

C-600 to C-2100: 18 to 80 HP

burner arrangements

may be equipped with any of the following:

1. light oil burner

Oil atomizing nozzle: Pressure atomizing type.

Fuel oil pump and assembly: Oil strainer, rotary gear type oil pump and oil pressure regulating valve built into one unit. This pump, driven by the blower motor, delivers fuel oil to the burner at a constant pressure of 100 psi. Capacity type pump of 13 GPH. Fuel oil inlet and return 3/8".

Oil solenoid valve: Provides automatic shut-off of oil to burner.

Oil pressure gauge.

2. gas burner

Gas burner nozzle: Same as above.

Gas solenoid valve: Provides automatic shut-off of gas to burner.

Gas check valve: Prevents back flow of air from burner into gas line. Minimum gas pressure required at point of inlet to Combustion Chamber: 4" to 6" water pressure.

3. combination light oil and gas burner

Burner for gas or oil: With combination burner all equipment listed under number 1 and 2 is provided.

Combustion control: Combination programming device and electronic combustion controls provide for complete safety at all times. It will stop and lock out the burner in the event of improper ignition or flame failure by closing fuel valves and stopping burner motor. The burner cannot restart until reset button is depressed manually.

Air safety switch: Insures a steady supply of air and instantly shuts off the main fuel valve and burner if the air supply fails.

Water level control relays: Water level in Cyclotherm units is controlled by means of electrodes (or probes) mounted on the boiler and extending to the boiler water level. Control is provided by actual contact of the boiler water with electrodes and not by use of floats or other mechanical devices. The relays will stop the burner on low water and also operate the boiler water feed pump to maintain proper water level.

Burner motor starter: Starts and stops burner motor and provides over-load protection.

Feed pump selector switch: A momentary contact switch with "Automatic-Manual" position. This switch normally is in automatic position but pump may be operated independent of Water Level Controls if switch is held in manual position.

for heavy oil operation only

Heavy oil pump selector switch: A three position switch with "Automatic-Off-Manual" positions provided with heavy oil burner. This switch normally is in automatic position but may be placed in manual position to run heavy oil pump motor to circulate heavy oil through heater before starting burner.

Oil temperature switch: May be set for the minimum heavy oil temperature required for efficient firing. It will operate to close fuel valves and shut down the burner at any time the oil temperature drops below the desired setting.

for combination oil and gas operation

Fuel selector switch: A two position switch marked "Oil-Gas." When changing from one fuel to another it is necessary to operate this switch and start or stop the fuel oil pump. It is also necessary to make manual changes in burner assembly.

controls

Control panel: Same as above.

Pressure control: Same as above.

Combustion control: Same as above.

Water level control relays: Same as above.

Burner motor starter: Starts and stops burner motor and provides over-load protection.

Limit selector switch: A three position switch with "High-Off-Low" positions. Used for starting and stopping burner. When moved to "Low" position, automatically connects low limit control (if provided).

Feed pump selector switch: Same as above.

boiler trim furnished:

Steam Safety Valve, or Valves, Steam Pressure Gauge, with Test Cock. Water Column with Try Cocks and Blow Down Valve on all units. Feed Water Globe and Check Valves on 100 thru 200 psi units. Injector and piping supplied on 200 HP and up.

optional electrical features

Auxiliary pressure control: Limits operation of units to a low stand-by pressure. Changeover from high to low pressure is effected by actuating the limit selector switch.

Auxiliary pressure control with time clock: Same as manual changeover except that electrical timing device is added which can be set for predetermined operating schedules.

Auxiliary thermostatic control: For heating or for off period stand-by loads. Manual or automatic controls can be furnished.

Auxiliary aquastat: Maintains boiler water temperature. Manual or automatic controls can be furnished.

*Any one of these controls will be supplied at the user's request. However, they can not be used in conjunction with each other.

optional equipment

Cyclotherm Feed water pump sets: Automatic boiler feed water pump and condensate receiver tank can be furnished to operate with any size and type of Cyclotherm Steam Generator.

Water heaters: Indirect water heaters of various types can be furnished for use with Cyclotherm Steam Generators. The factory will recommend the type of unit best suited upon receipt of operating details, gallons per hour and temperature rise.

elevation

Due to their unique design, altitude has little effect on the operation of Cyclotherm Steam Generators. If installation level is over 5,000 feet, specify exact altitude when ordering, so unit may be properly compensated at the factory before shipment.

painting

After final adjustments have been made and the performance test is completed Cyclotherm units are finished with a coat of metallic grey heat and rust resistant paint.

inspection

Each Cyclotherm unit is built and approved in accordance with ASME and National Board codes, and complies with all state and local regulations. All units above 15 psi are stamped with a National Board Number, and all are listed by the Underwriters' Laboratories, Inc. and carry their label. In addition, each unit undergoes a rigid fire test under specified operating conditions prior to final approval and release.

when requesting further information

Be sure to specify:

1. size and type.
2. operating steam pressure.
3. type and grade of fuel.
4. voltage, phase and frequency.
5. safety valve setting.
6. pressure control setting.
7. inspection.
8. elevation.
9. special features.
10. heat content of gas or specifications of oil to be used.

Partial list of national users of Cyclotherm generators

American Telephone and Telegraph Co., Inc.
New York, New York

American Can Company
New York, New York

Pfaudler Company
Rochester, New York

General Foods
New York, New York

Coca Cola Company
New York, New York

Pepsi Cola Company
New York, New York

Cherry Burrell Corporation
Cedar Rapids, Iowa

E. I. DuPont DeNemours Co.
Chicago, Illinois; Wilmington, Delaware; and Richmond, Virginia

Eastman Kodak Co.
Rochester, New York

National Carbon Company, Inc.
Acheson Works,
Niagara Falls, New York

National Dairy Company
Chicago, Illinois

Swift and Company
Chicago, Illinois and
Springfield, Missouri

Flintkote Mfg. Co.
Chicago Heights, Illinois

Gen'l American Transportation Co.
E. Chicago, Indiana

Liquid Carbonic Co.
Chicago, Illinois

Victor Chemical Co.
Chicago Heights, Illinois

Bond Clothing Store
Oak Park, Illinois

Good Humor Corp.
Chicago, Illinois

Tru-Ade, Inc.
Chicago, Illinois

Sloane Blabon Company
East Baldwin, Maine

Hires Bottling Company
Atlantic City, New Jersey

Canada Dry Bottling Company
Atlantic City, New Jersey

Ethyl Corporation
Edgemoor, Delaware

St. Regis Paper Company
Deferiot, New York

Westinghouse Electric
Richmond, Virginia

Dr. Pepper Bottling Company
Richmond, Virginia and
Newport News, Virginia

Remington-Rand Corp.
Alexandria, Virginia

Reynolds Metals Co.
Richmond, Virginia

Crosley Corporation
Division of Avco Corporation
Cincinnati, Ohio

Hotel Belmont Plaza
New York, New York

Nedicks, Inc.
New York, New York

Sun Chemical Company
Long Island City, New York

Revlon Cosmetics Corp.
New York, New York

City of New York
Dept. of Marine and Aviation
New York, New York

Brooklyn Union Gas Corp.
Jamaica, New York

Consolidated Laundries Corp.
New York, New York

Jacques Kreisler Mfg. Co.
North Bergen, New Jersey

Rutgers University
New Brunswick, New Jersey

Pyrene Mfg. Co.
Newark, New Jersey

United States Rubber Co.
Burlington, North Carolina

Union Carbide and Carbon Corp.
Ashtabula and Marietta, Ohio

Sunshine Biscuit Company
Dayton, Ohio

Columbia University
New York, New York

Tennessee Valley Authority
Nashville, Tennessee

City of New York Asphalt Plant
New York, New York

Port of New York Authority
New York, New York

Owens Illinois Glass Co.
Toledo, Ohio

Rockland Light & Power
Middletown and Nyack, New York

Long Island Lighting
Mineola, Long Island

Zonite Products Corp.
New York, New York

A. O. Smith Meter Corp.
New York, New York

Bethlehem Steel Co.
Lebanon, Pennsylvania

Allied Chemical and Dye
Providence, Rhode Island

Cyclotherm Corporation
Oswego, New York

Distributors in principal cities

Consult your local Classified Directory

Catalog No. 51